abnormal situation—Unplanned event or condition that adversely affects, potentially affects, or indicates degradation in the safety, security, or environmental or health protection performance or operation of a facility.

acceptable knowledge (AK)—A method used in lieu of or in conjunction with sampling and analysis to characterize materials and items through knowledge of (1) origin, (2) processes involved, (3) storage, (4) use of materials, and (5) segregation. The method may include supplemental waste analysis data, and facility records or analysis as applied to waste characterization.

accelerator—See *nonmedical accelerator facility*.

accessible RSSs—RSSs (see definition below) that are located in routinely used work areas approved for the conduct of normal RSS work.

Accident Response Group (ARG)—A group formed by DOE to respond to nuclear accidents/incidents.

accountable RSS—A sealed radioactive source with a half-life equal to or greater than 30 days and an isotopic activity equal to or greater than the corresponding value provided in Appendix A of chapter 16; also GCs containing RAM, regardless of the amount of radioactivity contained in the GC, and any machine neutron generator as defined in this LIR.

accuracy—The degree of agreement of the observed value with the true or correct value of the quantity being measured.

activation—The process of producing a radioactive material by bombardment with neutrons, protons, or other nuclear particles.

active RSS storage area—A designated, secure, storage location for RSSs, physically separate from a "long-term RSS storage area," wherein RSSs are stored and secured when not in routine use.

acute exposure—The exposure to a relatively large amount of radiation (or intake of radioactive material) over a short period of time, such as an hour or a day.

airborne radioactive material or airborne radioactivity—Radioactive material dispersed in the air in the form of dusts, fumes, particulates, mists, vapors, or gases.

airborne radioactivity area—Any accessible area where (1) the concentration of airborne radioactivity—above natural background—exceeds or is likely to exceed the derived air concentration (DAC) values listed in Appendix A or Appendix C of 10 CFR 835, November 4, 1998; or (2) an individual without respiratory protection could receive an intake exceeding 12 DAC-hours in a week.

air-line respirator or supplied-air mask—A full-face respirator that supplies air to the wearer through a hose from a compressor or a separate compressed-air cylinder.

air-purifying respirator—A full-face respirator equipped with replaceable HEPA, chemical, or combination cartridge(s).

AK—acceptable knowledge

ALI—annual limit on intake

ambient air—General air in the area of interest (e.g., the general room atmosphere) as distinct from a specific stream or volume of air that may have different properties.

American National Standards Institute (ANSI)—An organization that has formulated and published national voluntary consensus-type radiation safety standards in the form of ANSI N43.3 and ANSI N43.6.

analytical XGD—A type of intentional XGD consisting of local and remote components that use intentionally produced x-rays to evaluate—typically through x-ray diffraction or fluorescence—the phase state, surface characteristics, and/or elemental composition of various materials. **Guidance Note**: Local components include those that are struck by x-rays, such as the x-ray source housing, beam ports, shutter assemblies, collimators, sample holders, cameras, goniometers, detectors, and shielding. Remote components include power supplies, transformers, amplifiers, readout devices, and control panels.

annual limit on intake (ALI)—Derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by the reference man (ICRP Publication 23) that would result in a committed effective dose equivalent of 5 rem (0.05 sievert) or a committed dose equivalent of 50 rem (0.5 sievert) to any individual organ or tissue. **Guidance Note**: ALI values for intake by ingestion and inhalation of selected radionuclides are based on Table 1 of the US Environmental Protection Agency's Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," published September 1988.

ANSI—American National Standards Institute

area—For purposes of radiological control, a space is considered an area (and would be posted as an *area*) if it is accessible to an individual and that individual could receive a whole-body exposure (extremities are not considered whole body). However, containment devices such as glove boxes, hoods, or open-front boxes would not be posted as *areas* for radiological purposes unless an individual were to enter them.

ARG—Accident Response Group

as low as reasonably achievable (ALARA)—An approach to radiological control to manage and control exposures (individual and collective) to the work force and to the general public at levels that are as low as is reasonable, taking into account social, technical, economic, practical, and public policy considerations. **Guidance Note**: As used in this LIR, ALARA is not a dose limit but a process that has the objective of attaining doses that are as far below the applicable controlling limits as is reasonably achievable.

assessment—Evaluating or appraising a process, program, or activity to determine its acceptability.

attenuation—Reducing a radiation quantity upon passage of the radiation through matter resulting from all types of interaction with that matter.

background—Radiation from the following sources:

(1) naturally occurring radioactive materials that have not been technologically enhanced,

(2) cosmic sources,

(3) global fallout as it exists in the environment (such as from the testing of nuclear explosive devices),

(4) radon and its progeny in concentrations or levels (existing in buildings or the environment) that have not been elevated as a result of current or previous activities, and

(5) consumer products containing nominal amounts of radioactive material or producing nominal amounts of radiation.

barrier—An obstruction that prevents access to an area where high dose rates may exist.

becquerel (Bq)—The International System (SI) unit of radioactivity. One becquerel is the quantity of radioactive material in which one atom is transformed per second or undergoes one disintegration per second.

best available technology (BAT)—The preferred technology for treating a particular process liquid waste, selected from among others after taking into account factors related to technology, economics, public policy, and other parameters. **Guidance Note**: As used in DOE Order 5400.5, "Radiation Protection of the Public and the Environment," BAT is not a specific level of treatment, but the conclusion of a selection process that includes several treatment alternatives.

bioassay—Determining the kinds, quantities, or concentrations and, in some cases, locations of radioactive material in the human body, whether by direct measurement or by analysis and evaluation of radioactive materials excreted or removed from the human body.

cabinet XGD—A type of intentional XGD in which the x-ray tube is installed in an enclosure (cabinet) which, independent of existing architectural structures except the floor upon which it may be placed, is intended to (1) contain at least that portion of a material being irradiated, (2) provide radiation attenuation, and (3) exclude individuals from its interior during x-ray generation. Included in this definition are all XGDs designed primarily for inspecting carry-on baggage at airline, railroad, and bus terminals or similar XGDs used to radiologically inspect items before entry into a nuclear facility. **Guidance Note**: Not included in this definition are XGDs that use a building wall for shielding and XGDs that use portable shields on a temporary basis. Cabinet XGDs are certified as such by the Food and Drug Administration under 21 CFR 1020.40.

calibration—Adjusting and/or determining either one of the following:

(1) responding to or reading an instrument relative to a standard (e.g., primary, secondary, or tertiary) or to a series of conventionally true values, or

(2) the strength of a radiation source relative to a standard (e.g., primary, secondary, or tertiary) or conventionally true value.

CAM (continuous air monitor) alarm—CAM alarms include actuation of audible and visible indications, including both trouble type alarms and alarms indicating airborne radioactivity.

certification—Formally documented, auditable, quality assurance process by which LANL management is assured that employees have the requisite skills, knowledge, and abilities to perform their assigned duties. Certification is an official endorsement that an employee meets all criteria established by DOE orders and/or other external agencies.

CFR—Code of Federal Regulations

check source—A radioactive source, not necessarily calibrated, that is used to confirm the continuing satisfactory operation of an instrument.

chronic exposure—The exposure to relatively low levels of radiation (or intake of radioactive materials) over a long period of time (that is, over a lifetime).

class I XGF—An XGF in which, on the protective side of the shielding surrounding the XGD, the operator is exposed to a radiation dose rate that is less than 0.5 mrem in any one hour measured 2 inches (5 cm) from the outer shielding surface. Radiation shielding surrounding the XGD must be permanent (nonremovable), and any interlocks must not be capable of being overridden. Examples of such low-hazard class I XGFs include most incidental XGDs; intentional XGFs determined to be "exempt shielded" and "unattended" installations under ANSI N43.3; cabinet XGDs; and enclosed-beam analytical XGDs.

class II XGF—An XGF whose radiation output and degree of use create a realistic potential for the operator, on the protective side of the shielding surrounding the XGD, to be exposed to a radiation dose rate greater than 100 mrem in one year, but less than or equal to 25 mrem in any work week evaluated one foot (30 cm) from the outer shielding surface. Such facilities have interlocks similar to class I facilities; however, the shielding typically is not as extensive. Examples of XGFs that do not normally exceed these operator dose rate limits include "open-beam" analytical XGDs and many intentional XGFs, defined below.

class III XGF—An XGF whose radiation output and degree of use create a realistic potential for the operator, on the protective side of the shielding surrounding the XGD, to be exposed to a radiation dose rate greater than or equal to 25 mrem in any work week evaluated one foot (30 cm) from the outer shielding surface. In the absence of any dedicated radiation shielding surrounding the XGD (e.g., portable XGDs used outdoors), the emission limit of greater than 25 mrem in any work week shall be evaluated one foot (30 cm) from the exterior surface of the XGD tube housing. Examples of Class III XGFs are "open" intentional XGD installations and some incidental XGDs.

collimator—Device used to limit the size, shape, and direction of the primary XGD beam.

commingling area—An area where personnel wearing anti-c clothing and personnel wearing personal clothing or work clothing used in uncontrolled areas may come into contact with each other.

containment device—Barrier such as a glove bag, glove box, or tent for inhibiting the release of radioactive material from a specific location.

contamination—Deposition of radioactive material anywhere it is not desired, particularly where its presence may be harmful.

contamination area—Any area, accessible to individuals, where removable surface contamination levels exceed or are likely to exceed the removable surface contamination values specified in Table 14-1, but do not exceed 100 times those values.

contamination survey—Use of smears, swipes, or direct instrument surveys to identify and quantify radioactive material on personnel, on equipment, or in areas.

continuous air monitor (CAM)—An instrument that continuously samples and measures the levels of airborne radioactive materials on a "real-time" basis and has alarm capabilities at preset levels. Also known as a real-time air monitor.

contractor—Any entity under contract with the Department of Energy with the responsibility to perform activities at a DOE site or facility.

controlled area (same as radiological controlled area)—Any area to which access is managed by or for DOE to protect individuals from exposure to radiation and/or radioactive material.

critical mass—The smallest mass of fissionable material that will support a self-sustaining chain reaction under specified conditions.

criticality—See *nuclear criticality*.

critique—Meetings of personnel involved in or knowledgeable about an event (either a success or an abnormal event) to document a chronological listing of the facts.

DAC—derived air concentration

DCG—derived concentration guide

declared pregnant worker—A woman who has voluntarily declared to her employer, in writing, her pregnancy for the purpose of being subject to the occupational dose limits to the embryo/fetus as provided at Table 4-1. This declaration may be revoked, in writing, at any time by the declared pregnant worker.

decontamination—Process of removing radioactive contamination and materials from personnel, equipment, or areas.

Department of Transportation (DOT)

depleted uranium (DU)—Uranium that is almost exclusively U-238 because the naturally occurring isotope U-235 has been extracted.

derived air concentration (DAC)—For the radionuclides listed in Appendix A of 10 CFR 835, the airborne concentration that equals the ALI divided by the volume of air breathed by an average worker for a working year of 2000 hours (assuming a breathing volume of 2400 m^3). For radionuclides listed in Appendix C of 10 CFR 835, the air

immersion DACs were calculated for a continuous, nonshielded exposure via immersion in a semi-infinite atmospheric cloud. **Guidance Note**: The values are based on the derived airborne concentration found in Table 1 of the US Environmental Protection Agency's Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," published September 1988.

derived air concentration-hour (DAC-hour)—The product of the concentration of radioactive material in air (expressed as a fraction or multiple of the DAC for each radionuclide) and the time of exposure to that radionuclide, in hours.

derived concentration guide (DCG)—The concentration of a radionuclide in air or water that, under conditions of continuous exposure for one year by one exposure mode (that is, ingestion of water, submersion in air, or inhalation), would result in an effective dose equivalent of 100 mrem *or* 0.1 rem (1 mSv). **Guidance Note**: DCGs do not consider decay products when the parent radionuclide is the cause of the exposure (DCG values are presented in chapter III of DOE Order 5400.5) (1 rem = 0.01 sievert).

detection limit—The extreme of detection or quantification for the radiation of interest by the instrument as a whole or an individual readout scale. **Guidance Note**: The *lower detection limit* is the minimum quantifiable instrument response or reading. The *upper detection limit* is the maximum quantifiable instrument response or reading.

detector—A device or component that produces an electronically measurable quantity in response to ionizing radiation.

direct survey—Quantitative survey for detecting the presence of both removable and fixed contamination (total contamination) on a surface. **Guidance Note**: This test is normally performed by either holding or slowly moving a portable survey instrument detector over a surface and counting the radioactive emissions from the total contamination residing on the surface.

disintegration per minute (dpm)—The rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

division training generalist (DTG)—An individual who acts as the organizational unit's primary point of contact for the Laboratory-wide training groups and facility-training contacts.

DOE—Department of Energy

DOE activity—An activity taken for or by DOE in a DOE operation or facility that has the potential to result in the occupational exposure of an individual to radiation or radioactive material. **Guidance Note**: The activity may include design, construction, operation, or decommissioning. To the extent appropriate, the activity may involve a single DOE facility or operation or a combination of facilities and operations, possibly including an entire site or multiple DOE sites.

DOELAP—DOE Laboratory Accreditation Program; a program that accredits external dosimetry and internal dose assessment programs to DOE standards.

dose—a general term for absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent as defined in this glossary.

DU—depleted uranium (see definition on page 4).

The following section contains definitions of dose terms that are used for various exposure calculations and record-keeping purposes:

absorbed dose (D)—The energy absorbed by matter from ionizing radiation per unit mass of irradiated material at the place of interest in that material. The absorbed dose is expressed in units of rad (or gray) (1 rad = 0.01 gray).

collective dose—The sum of the total effective dose equivalent values for all individuals in a specified population. Collective dose is expressed in units of person-rem (or person-sievert).

committed dose equivalent ($H_{T,50}$)—The dose equivalent calculated to be received by a tissue or organ over a 50-year period after the intake of a radionuclide into the body. It does not include contributions from radiation sources external to the body. Committed dose equivalent is expressed in units of rem (or sievert).

committed effective dose equivalent ($H_{E,50}$)—The sum of the committed dose equivalents to various tissues in the body ($H_{T,50}$), each multiplied by the appropriate weighting factor (W_T) - **that is** $H_{E,50} = W_T H_{T,50}$. Committed effective dose equivalent is expressed in units of rem (or sievert).

cumulative total effective dose equivalent—The sum of all total effective dose equivalent values recorded for an individual, where available, for each year occupational dose was received, beginning January 1, 1989.

deep dose equivalent—The dose equivalent derived from external radiation at a tissue depth of 1 cm in tissue.

dose equivalent (H)—The product of the absorbed dose (D) (in rad or gray) in tissue, a quality factor (Q), and all other modifying factors (N). Dose equivalent is expressed in units of rem (or sievert) (1 rem = 0.01 sievert).

effective dose equivalent (H_E)—The summation of the products of the dose equivalent received by specified tissues of the body (H_T) and the appropriate weighting factor (W_T)—that is, ($H_E = W_T H_T$). It includes the dose from radiation sources internal and/or external to the body. For purposes of compliance with this LIR, deep dose equivalent to the whole body may be used as effective dose equivalent for external exposures. The effective dose equivalent is expressed in units of rem (or sievert).

external dose or exposure—The portion of the dose equivalent received from radiation sources outside the body (i.e., “external sources”).

gray (Gy)—SI unit of absorbed dose. One gray is equal to an absorbed dose of 1 joule per kilogram (100 rad).

internal dose or exposure—That portion of the dose equivalent that is received from radioactive material taken into the body (e.g., “internal sources”).

lens-of-the-eye dose equivalent—The external exposure of the lens of the eye; taken as the dose equivalent at a tissue depth of 0.3 cm.

quality factor (Q)—The modifying factor used to calculate the dose equivalent from the absorbed dose; the absorbed dose (expressed in rad or gray) is multiplied by the appropriate quality factor.

The quality factors to be used for determining dose equivalent in rem shall be as follows:

Radiation Type	Quality Factor
X-rays, gamma rays, positrons, electrons (including tritium beta particles	1
Neutrons, 10 keV	3
Neutrons, >10 keV	10
Protons and singly-charged particles of unknown energy with rest mass greater than one atomic mass unit	10
Alpha particles and multiple-charged particles (and particles of unknown charge) of unknown energy	20

When spectral data are insufficient to identify the energy of the neutrons, a quality factor of 10 shall be used. When spectral data are sufficient to identify the energy of the neutrons, the following mean quality factors may be used:

Quality Factors for Neutrons

Neutron Energy (MeV)	Mean Quality Factor	Neutron Flux Density ($cm^{-2}s^{-1}$)
2.5×10^{-8} thermal	2	680
1×10^{-7}	2	680
1×10^{-6}	2	560
1×10^{-5}	2	560
1×10^{-4}	2	580
1×10^{-3}	2	680
1×10^{-2}	2.5	700
1×10^{-1}	7.5	115
5×10^{-1}	11	27
1	11	19
2.5	9	20
5	8	16
7	7	17
10	6.5	17
14	7.5	12
20	8	11
40	7	10
60	5.5	11
$1x10^2$	4	14
$2x10^2$	3.5	13
$3x10^2$	3.5	11
$4x10^2$	3.5	10

rad—Unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs per gram or 0.01 joules per kilogram 1 (0.01 gray).

rem—Unit of dose equivalent. Dose equivalent in rem is numerically equal to the absorbed dose in rad multiplied by a quality factor, distribution factor, and any other necessary modifying factor (1 rem = 0.01 sievert).

shallow dose equivalent—The dose equivalent deriving from external radiation at a depth of 0.007 cm in tissue.

sievert (Sv)—SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (1 Sv = 100 rem).

total effective dose equivalent (TEDE)—The sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

weighting factor (W_T)—The fraction of the overall health risk, resulting from uniform, whole-body irradiation, attributable to specific tissue (T). The dose equivalent to tissue (H_T) is multiplied by the appropriate weighting factor to obtain the effective dose equivalent contribution from that tissue. (Refer to Appendix 4A for the weighting factors.)

whole body—For the purposes of external exposure, head, trunk (including male gonads), arms above and including the elbow, or legs above and including the knee.

End of special terms for "dose."

dose assessment—Process of determining radiological dose and uncertainty included in the dose estimate, through the use of exposure scenarios, bioassay results, monitoring data, source term information and pathway analysis.

DOT—Department of Transportation

dosimeter—A device for measuring and registering radiation dose.

dosimetry—The measurement of radiation doses.

embedded RSS—A small-activity RSS intentionally installed in a radiation measurement instrument at the time of manufacture that is *not* intended to be removed or adjusted by the instrument user and which provides internal calibration, standardization, or functional checking of the instrument. **Guidance Note**: Some liquid scintillation counters, beta/gamma radiation area monitors, tritium monitors, and process equipment contain embedded RSSs.

embryo/fetus—Developing human organism from conception to birth (same as "unborn child"). ◘

emergency off switch—See "SCRAM button" below.

Employee Development System (EDS)—A database that documents each LANL employee's job-related training.

enclosed-beam analytical XGD—An analytical XGD in which all possible x-ray paths (primary as well as diffracted beams) are fully enclosed and which meets the radiation safety requirements specified in ANSI N43.2 (referenced in chapter 18, Part 3).

energy dependence—A change in instrument response with respect to radiation energy for a constant exposure or exposure rate.

engineering controls—Use of components and systems to reduce dose and airborne radioactivity and the spread of contamination by using piping, containment devices, ventilation, filtration, or shielding.

entrance or access point—Any location through which an individual could gain access to areas controlled for the purposes of radiation protection. This includes entry or exit portals of sufficient size to permit human entry, irrespective of their intended use.

Environment, Safety, and Health Division—ESH Division

escort (qualified escort)—an individual who has current radiological training for the area to be entered by the escorted individual and who ensures that the escorted individual implements the requirements of the LANL Radiation Protection Program for the area to be entered.

escorted individual—An individual who is accompanied by another individual who has current radiological training for the area being entered. The trained individual (that is, the escort) has direct verbal control of the individual being escorted and is in reasonably close physical proximity to the individual.

exempt shielded intentional XGF installation—An intentional XGF that meets the radiation safety requirements specified in ANSI N43.3 (referenced in chapter 18, Part 3) and that provides such a high degree of protective shielding to the operator that individual dosimetry is generally not necessary.

exposure—Being exposed to *ionizing radiation* or to radioactive material.

external radiation—an ionizing radiation (gamma, x-ray, beta, alpha, neutron) field created by radioactive material or a radiation-producing device external to the human body.

extremity—Hands and arms below the elbow or feet and legs below the knee.

facility—A facility includes systems, buildings, utilities, and related activities whose use is directed to a common purpose at a single location. Examples include accelerators, storage areas, nuclear reactors, radioactive waste disposal systems, testing laboratories, and research laboratories.

facility manager (FM)—A person responsible for the delineation, maintenance, and management of the safety envelopes of the major facilities located within the geographical boundaries of the facility management unit (FMU).

fail-safe—A term applied to devices that, in their most likely "single point" failure modes, fail in a manner that mitigates the hazard. Also a device design in which all credible failure modes of x-ray system indicator or radiation safety components results in a condition in which individuals are intrinsically safe from exposure to x-rays. **Guidance Note**: Such a design may cause beam port shutters to close, primary transformer electrical power to be interrupted, or otherwise prevent the production of x-rays upon failure of the safety or warning device.

filter integrity test—Test performed on High-Efficiency Particulate Air (HEPA) filters to identify any damage to the filter or leakage around the filter.

fissile material—Any material fissionable by *thermal* (slow) neutrons. The three primarily fissile materials are U-233, U-235, and Pu-239.

fissionable material—Any material fissionable by *thermal* (slow) or fast neutrons. Radionuclides such as U-238 are fissionable by fast neutrons.

five-step approach to safety—Part of the safety culture for performing work that comprises five elements—defining the scope of work, analyzing the hazards, developing and implementing controls, performing work, and using feedback to identify improvement opportunities.

fixed contamination—Contamination that can only be removed from surfaces by destructive means (such as grinding or chipping). For posting purposes, fixed contamination exceeding Table 14-1 limits are of concern.

FM—facility manager

FMU—facility management unit

frisk or frisking—Process of monitoring personnel for contamination. **Guidance Note**: Frisking can be performed with a hand-held survey instrument, automated monitoring device or by a radiological control technician.

GC—gas chromatograph, an apparatus used to (1) detect and identify certain chemically volatile compounds, (2) determine certain physical properties of such compounds, and/or (3) isolate components or fractions of certain complex compounds.

general employee—A DOE or DOE subcontractor employee; an employee of a subcontractor to a DOE contractor; or an individual who performs work for or in conjunction with DOE or uses DOE facilities.

geotropism—A change in instrument response with a change in instrument orientation as a result of gravitational effects.

gestation period—The time from conception to birth, approximately nine months in a human being.

GPHS—General purpose heat source. A device containing SNM, the radioactive decay heat from which heat is provided to nearby assembly components.

hazard control plan (HCP)—A document that at a minimum defines the work, identifies the hazards associated with the work, and describes the controls needed to reduce the risk posed by the work to an acceptable level.

HCP—hazard control plan

health physics technician (HPT)—A worker who has completed portions of the Radiological Control Technician (RCT) training but has not become fully qualified.

HEPA —high-efficiency particulate air filter

hermetically sealed—Sealing an item with an air tight or impermeable barrier, so that it has no potential for internal contamination.

High Contamination Area—Any accessible area where removable surface contamination levels exceed or are likely to exceed 100 times the removable surface contamination values specified in Table 14-1.

High Radiation Area—Any accessible area where radiation levels could result in an individual receiving a deep dose equivalent in excess of 0.1 rem (0.001 sievert) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

high-activity RSS—An RSS (see definition below), typically in the "tens of Curies" activity range or greater, that is used as a radiation source for field radiography operations or used to provide intense irradiation of biological or industrial materials. **Guidance Note**: Such high-activity gamma-emitting RSSs fall under the purview of ANSI N43.3.

high-efficiency particulate air (HEPA) filter—Throwaway extended pleated medium dry-type filter with (1) a rigid casing enclosing the full depth of the pleats, (2) a minimum particle removal efficiency of 99.97 percent for thermally generated monodispersed di-octyl phthalate smoke particles with a diameter of 0.3 micrometer, and (3) a maximum pressure drop of 1.0 inch water gauge (w.g.) when clean and operated at its rated airflow capacity.

hot job exclusion area (HJEA)—A temporary area established around an unknown condition in the event of a radiological incident or an operation that is expected to increase the potential for contamination and/or personnel exposure because of the nature of the operation (hot job).

hot particle—A "hot particle" is a small, loose, highly radioactive particle with an activity greater than 15,000 disintegrations per minute and/or capable of producing a shallow dose equivalent greater than 100 mrem in 1 hour.

HP—health physicist

immediately dangerous to life or health (IDLH)—Atmospheres containing either (1) less than 19.5 % oxygen by volume or (2) air concentrations of toxic or radioactive contaminants that pose an immediate threat to life or produce immediate, irreversible, debilitating health effects.

inaccessible RSSs—RSSs (see definition below) located in areas that are difficult or dangerous to access. Examples of inaccessible RSSs include an RSS located at the top of a tall tower or an RSS located in an oxygen deficient atmosphere or in a Very High Radiation Area. **Guidance Note**: Inaccessible RSSs do not include RSSs located in shielding pigs or radiography (gamma camera) units.

incidental XGD—An XGD that emits or produces x-rays during normal operation in which the x-rays are an unwanted byproduct of the device's intended purpose. **Guidance Note**: The x-rays are produced only when electrons are accelerated under vacuum, are not put to any constructive use in a particular application, and are not intentionally conveyed beyond the contiguous vacuum in which they are produced.

Examples: Electron microscopes that operate at greater than or equal to 40 kiloelectron volts (keV) electron kinetic energy; video display terminals; high-voltage electron guns (cathode ray tubes) or electron pulse generators; electron beam welders; high-voltage switches and power supplies; field emission electron beam diodes; televisions; ion implantation devices; electron beam furnaces; magnetrons, klystrons, and other radiofrequency (RF) tubes; Auger electron generators; and vacuum ion sputterers.

individual—Any human being.

infrequent or first-time activities—Radiological work activities or operations that require special management attention and consideration of new or novel radiological controls. The designation of infrequent or first-time activities applies specifically to facilities that conduct routine and recurring process operations, and does not apply to facilities that routinely conduct first-time activities, such as experimental or research facilities.

instrument—A complete system designed to quantify one or more particular ionizing radiation or radiations.

integrity test—Also called a "leak test" (see definition below).

intentional XGD—A category of XGD typically housed within a fixed, interlocked, and/or shielded enclosure/room, specifically designed to intentionally produce and convey beyond the vacuum surrounding the electron acceleration chamber ionizing bremsstrahlung and/or characteristic x-ray radiation that are then used for purposes of imaging, analysis, or research for which such radiation is essential to the process.

Example of facilities housing: conventional (Coolidge) XGDs; magnetic induction devices (betatrons) used to intentionally produce x-rays; electron linear accelerators (LINAC) used to produce x-rays; portable and fixed flash XGDs; analytical XGDs; cabinet XGDs; and Van de Graaff generators used to intentionally produce x-rays.

interlock—A connection between devices that makes the state of one dependent on the state of the other, usually in the context where one state of the interlock causes the controlled device to mitigate the hazard; a device for preventing access to a radiation hazard area either by preventing entry or by automatically removing the hazard when the device is actuated. **Guidance Note**: The safety function of an interlock is to prevent personnel access from outside to the inside of a radiation exposure room/enclosure when x-rays or other types of radiation (for example, accelerator beam) are being generated.

job-specific training—Training required for a worker to perform a particular job.

Joint Tactical Operations Team (JTOT)—A Department of Defense team augmented by LANL personnel involved in the search for and disabling of terrorist nuclear devices.

knowledge of process (KOP)—A method used to characterize waste through knowledge of the material origin, any processes involved, storage of the material, use of the material, and the segregation of the material from potential radioactive contamination. See also *acceptable knowledg*e, which is the preferred terminology.

LANL—Los Alamos National Laboratory

LANL-owned RSSs—RSSs (see definition below) that do not have to be licensed by the NRC or an NRC Agreement State. **Guidance Note**: Johnson Controls Northern New Mexico (JCNMM) is authorized to procure and possess RSSs that are owned by LANL.

LANL-owned XGD—XGDs owned by LANL that do *not* have to be licensed or authorized by the New Mexico Office of Radiological Control. XGDs purchased by Johnson Controls Northern New Mexico (JCNMM), as the primary infrastructure contractor to LANL, are "LANL-owned" in the sense that they do not have to be licensed or authorized by the state of New Mexico Office of Radiological Control.

large-area-swipe survey—Qualitative survey for detecting the presence of removable contamination by wiping Masslinn (or an equivalent material such as cheese cloth) over at least 1000 cm of the surface and counting the residual activity on the Masslinn with an appropriate portable radiation survey instrument.

lead RCT—The RCT who is assigned the primary responsibility for radiological controls at a facility.

leak test—Also called an "integrity test," determines if a sealed radioactive source is leaking radioactive material; a procedure used to evaluate whether the integrity of the source bonding or encapsulation has been breached in such a way that RAM can escape.

level I clothing—One pair of coveralls, two pairs of anti-C gloves (inner pair taped), one pair of booties, and skull cap (or hood).

level II clothing—Two pairs of coveralls, two pairs of anti-C gloves (inner pair taped), two pairs of booties, and hood.

lifetime dose—Total occupational exposure over a worker's lifetime, including external and committed internal dose.

likely—Having greater than a 50% probability of occurrence within a defined period of time, typically a year.

long-term RSS storage area—A designated, secure storage location for RSSs, physically separate from any "active RSS storage area," wherein RSSs no longer routinely used are stored and secured.

low-level radioactive solid waste—Waste material that has been contaminated or activated in excess of established limits and has not been classified as high-level waste, transuranic waste, spent fuel, or mixed waste.

LRACS—Los Alamos National Laboratory Radioactive Sealed Source Accountability and Control System, an unclassified database system developed and maintained by ESH-12 for use by SCs as the single, official Laboratory-wide means of accounting and controlling RSSs/GCs containing RAM/and machine neutron generators accountable under this LIR.

machine neutron generator—An electrical device that accelerates deuterons to kinetic energies of a few hundred kilovolts within an evacuated cavity into either a deuterated or tritiated target material to produce pulses of neutrons or a device in which photons are used to liberate neutrons from a low-Z target material.

MASS—Materials Accountability Safeguards System, an accountability/control database system driven by DOE Order 474.1 that accounts for stockpile amounts of certain radioactive and nonradioactive isotopes, in sealed or unsealed form, useful in nuclear weapons.

member of the public—An individual who is not a general employee. **Guidance Note**: An individual is not a "member of the public" during any period in which the individual receives an occupational dose.

minimum detectable activity (MDA)—The minimum activity, above background, that can be detected with any specific instrument based upon the instrument and technique used.

minimum detectable count rate (MDCR)—The minimum count rate, above background, that can be detected with a stated confidence level using appropriate instruments and techniques.

minor—An individual who is less than 18 years of age.

mixed waste—Waste containing both radioactive and hazardous components as defined by the Atomic Energy Act and the Resources Conservation and Recovery Act, respectively.

modification—Any alteration by LANL or the XGD manufacturer of the shielding configuration or XGD or XGF operating practices, or the replacement of the original XGD (or component part thereof) with another that has not been previously evaluated, inspected, monitored, and documented by the RPO. **Guidance Note**: This definition also includes collocation of additional or multiple unevaluated XGDs within a previously evaluated XGF.

monitoring—Measuring radiation levels, airborne radioactivity concentrations, radioactive contamination levels, quantities of radioactive material, and individual doses and using the results of these measurements to evaluate radiological hazards or potential and actual doses resulting from exposures to ionizing radiation.

NIST—National Institute of Standards and Technology

no detectable activity (NDA)—activity that is less than the minimum detectable activity (< MDA).

nonmedical accelerator facility—A machine, commonly housed within a fixed supporting structure, designed to *intentionally* increase the kinetic energy of stable charged particles or ions wherein

(1) Particle/ion kinetic energy is increased via an electric field within specially designed evacuated or plasma-filled acceleration components, and beam collimation and steering is achieved via a concomitant magnetic field acting beyond or between the acceleration components;

(2) Any particulate or other radiation produced within—and/or discharged beyond—the contiguous vacuum that creates a radiological area caused by prompt (beam "on") particles/ions or beam radiation and/or induced radioactivity from beam interactions with targets where significant portions of the whole body (as opposed to the extremities) could be exposed;

(3) The resultant particulate or other radiation produced in and discharged beyond the contiguous vacuum into free space that consists of ionizing radiation other than x-ray photons intentionally produced for x-ray applications; and

(4) Any unsealed radioactivity produced by the accelerator facility, other than fixed activation products, is present in amounts sufficient to determine the hazard category and conduct an accident analysis based on the total amount of unsealed, nonactivation product radionuclides contained within the facility.

Examples: free-electron lasers (FEL) given that such devices can produce radiation other than ionizing x-ray photons; the Stanford Linear Accelerator (SLAC); the Los Alamos Neutron Science Center (LANSCE) facility; cyclotron, synchrocyclotron, and isochronous cyclotron facilities; and single and tandem Van de Graaff generators and ion LINAC facilities, when used to produce and discharge into free space ionizing radiation other than photons, are considered to fall under this definition provided they meet criterion (2), above.

Specifically *excluded* from this definition are facilities housing

(1) Devices that accelerate electrons for the purposes of intentional x-ray production. Such devices include some Van de Graaff generators, electron LINACs, flash x-ray machines, and betatrons used, for example, in nondestructive testing (NDT); and

(2) Various electronic devices that contain within vacuum a source of electrons and an accelerating potential difference that produce ionizing radiation as an incidental/unwanted byproduct of their primary function (for example, electron microscopes that operate at 100-keV-electron kinetic energy or less; video display terminals;

televisions; ion implantation devices; electron beam furnaces; magnetrons, klystrons, and other radiofrequency (RF) tubes; Auger electron generators; vacuum ion sputterers; low-voltage machine neutron generators.

nonstochastic effects—effects caused by radiation exposure for which the severity varies with the dose and for which a threshold normally exists (e.g., radiation-induced opacities within the lens of the eye).

NRC—Nuclear Regulatory Commission

nuclear criticality—A self-sustaining chain reaction, i.e., the state in which the effective neutron multiplication constant of a system of fissionable material equals or exceeds unity.

occupational dose—An individual's ionizing radiation dose (external and internal) that is received as a result of that individual's work assignment. Occupational dose does not include doses received as part of a medical procedure or doses resulting from background radiation or participation as a subject in medical research programs.

off-site shipment—Movement of hazardous material beyond the confines of the LANL site to another location.

on-site transfer—Movement of hazardous materials out-of-doors between buildings or locations on the LANL site over roadways to which the public does not have uncontrolled access. Examples are roadways behind a security gate or Pajarito Road when it is closed to the public.

open intentional XGD installation—An intentional XGD installation that meets the radiation safety requirements specified in ANSI N43.3 (referenced in chapter 18, Part 3). **Guidance Note**: Such installations typically provide little protective shielding for the operator, such as an XGD used outdoors.

open-beam intentional XGD—An analytical XGD that has one or more x-ray paths (primary or diffracted beams) not fully enclosed and that meets the radiation safety requirements specified in ANSI N43.2 (referenced in chapter 18, Part 3).

operational check—Any check or test of an instrument to determine if that instrument is operating acceptably. *Note: The definition is different for ESH-1 procedures.*

operation-specific training—The training required for a worker to perform a particular aspect of a job or unique operation.

other authorized x-ray safety support personnel—Personnel, typically HPs having professional training in the field of health physics, who have described to their group leader in writing their credentials, professional experience, and job capabilities in enough detail to convince the group leader to certify in writing under LIR300-00-01, "Safe Work Practices," that the personnel are qualified and authorized to provide x-ray safety support to LANL on-site and/or off-site x-ray operations.

out-of-service RSS—RSSs (see definition below) that are not anticipated to be used before 6 months or longer that can be taken "out-of-service" and segregated in a secure "long-term RSS storage area."

performance check or *performance test*—A test of an instrument to determine if (1) its response is within a stated acceptable range, (2) any alarms associated with the instrument correctly actuate, and (3) the instrument is otherwise operating acceptably. *Note: The definition is different for ESH-1 procedures*

personal protective equipment (PPE)—Equipment such as booties, anti-C overalls, gloves, respirators, face shields, and safety glasses used to protect workers from excessive exposure to radioactive or hazardous materials.

person—Any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, government agency; any state or political subdivision of, or any political entity within a state; any foreign government or nation or other entity; and any legal successor, representative, agent, or agency of the foregoing;

provided that person does not include the Department of Energy or the United States Nuclear Regulatory Commission.

personnel dosimetry—Devices designed to be worn by a single person to assess dose equivalent. Such devices include film badges, thermoluminescent dosimeters (TLDs), and pocket ionization chambers.

personnel monitoring—Systematic and periodic estimate of radiation dose received by personnel during working hours; the monitoring of personnel and their excretions, skin, or any part of their clothing to determine the amount of radioactivity present.

photon—A quantum of electromagnetic radiation irrespective of origin.

planned special exposure (PSE)—Preplanned, authorized, infrequent exposure to radiation, separate from and in addition to the annual dose limits.

potential for exposure—A basis for determining the effort to apply a graded approach to the ALARA program. The table in Appendix 3A shows how organizations and facilities are categorized.

PPE—personal protective equipment.

prefilter—Filter that provides first-stage air filtration to remove larger particulates and prolong the efficient use of a HEPA filter.

prenatal radiation exposure—The exposure of an embryo/fetus to radiation.

primary dosimeter—A dosimeter worn on the body to obtain a formal record of whole-body radiation dose.

prompt radiation—Radiation resulting from the accelerator beam or the interaction of the accelerated beam with surrounding matter. **Guidance Note**: Prompt radiation ceases to exist shortly after the beam is removed, typically in less than one second. Radiation emitted from residual radioactivity is not considered prompt radiation.

protective clothing—Clothing provided to personnel to minimize contamination to the skin and to personal and company-issued clothing. Also referred to as "anticontamination clothing," "anti-Cs," and "PCs."

public—Any individual or group of individuals who is not occupationally exposed to radiation or radioactive material. An individual is not a "member of the public" during any period in which the individual receives an occupational dose. Also see *member of the public*.

qualitative—In the context of performing a contamination survey, refers to measuring contamination without reliably measuring the amount of contamination present. **Guidance Note**: Qualitative survey results are *not* used to establish posting requirements or to release materials or areas. Large area swipes and direct floor monitor surveys are qualitative surveys used mostly for the following reasons:

- as a means of promptly assessing whether low-level fixed or removable contamination exists in an area,
- to quickly delineate a contamination boundary,
- for surveying when hot particles are a potential problem, and
- for routine surveys of uncontrolled areas, radiological controlled areas, or radiological buffer areas.

quantitative—In the context of performing a contamination survey, refers to measuring both the presence and amount of contamination present. **Guidance Note**: Quantitative surveys are used to establish posting requirements, and to release materials or areas. Smear surveys and direct surveys, taken with hand-held instruments, are quantitative surveys used to reliably measure contamination levels.

radiation—Ionizing radiation, which is alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. Radiation as used in this LIR does not include nonionizing radiation, such as radio- or microwaves, or visible, infrared, or ultraviolet light.

radiation area—Any accessible area in which radiation levels could result in an individual's receiving a deep dose equivalent in excess of 0.005 rem (0.05 millisievert) in 1 hour at 30 centimeters from the source or from any surface that the radiation penetrates.

radiation interlock—A radiation detection device that turns an accelerator beam off or returns a source to its enclosure when radiation levels at predetermined locations exceed a preset dose rate.

radiation protection organization (RPO)—The groups (ESH-1, ESH-4, ESH-12, and radiation protection team of ESH-13) responsible for defining and implementing the occupational radiation protection program at the Laboratory.

Radiation Protection Program manager—The individual responsible for overall direction of the Laboratory's occupational radiation protection program.

radiation survey—Measurement with instrumentation to evaluate and assess the presence of radioactive materials or other sources of radiation under a specific set of conditions.

radiation worker—same as radiological worker

radioactive material—Any material, equipment, or system component determined to be contaminated or suspected of being contaminated. Radioactive material also includes activated material, sealed and unsealed sources, and material that emits ionizing radiation. For transportation purposes (DOT definition), radioactive material is material with a specific activity that is greater than 0.002 µCi/g (> 2 nCi/g).

radioactive material area—Any area, accessible to individuals, in which items or containers of radioactive material are present and the total activity of radioactive material exceeds the applicable values listed in Appendix 16A of this LIR.

radioactive material transportation—The movement of radioactive material by aircraft, rail, vessel, or highway vehicle when such movement is subject to DOT regulations or DOE orders that govern such movements. **Guidance Note**: Radioactive material transportation does not include preparation of material or packagings for transportation, monitoring required by 10 CFR Part 835, storage of material awaiting transportation, or application of markings and labels required for transportation.

radioactivity—A natural and spontaneous process by which the unstable atoms of an element emit or radiate excess energy from their nuclei and, thus, change (or decay) to atoms of a different element or to a lower energy state of the same element.

radiography—Examining the structure of materials by nondestructive methods, using a radioactive source or a radiation-generating device.

radiological ambient conditions—The average radiological conditions that exist in an area, including dose rates, surface contamination levels, and airborne radioactivity levels.

radiological area—Any area within a controlled area defined in this section as a "radiation area," "High Radiation Area," "Very High Radiation Area," "Contamination Area," "High Contamination Area," or "Airborne Radioactivity Area."

Radiological Buffer Area (RBA)—An area within a Radiological Controlled Area and outside a radiological area that provides a second boundary to minimize personnel exposure and the spread of contamination. **Guidance Note**: This area surrounds or is contiguous with Contamination Areas, High Contamination Areas, Airborne Radioactivity Areas, Radiation Areas, High Radiation Areas, or Very High Radiation Areas.

radiological control hold point—Cautionary step in an RWP or technical work document in which work is stopped and the RCT or **HPT** performs some action or verification.

radiological control personnel—individuals within the radiation protection organization (RPO).

radiological control technician (RCT)—A person who has been trained in the RCT training program at LANL, whose RCT certification is current, and who is assigned to or authorized by the ESH-1 Health Physics Operations group to provide radiological safety support. Also called radiological worker or radiation worker.

radiological incident—Any unexpected event resulting from the use of radioactive materials or radiation-producing equipment that meets the criteria specified on the RIR (Radiological Incident Report) form and summarized in the reporting levels table (in LIR201-00-04, "Los Alamos National Laboratory Incident Notification Process").

radiological occurrence—An event or condition to be reported in accordance with DOE Order 232.1, Chg 2, "Occurrence Reporting and Processing of Operations Information," with the ESH-7 *Occurrence Investigating and Reporting Manual*, or with ESH-7 guidance.

radiological posting—Sign, label, or tag that indicates the presence or potential presence of radiation or radioactive materials.

radiological work—Any work that requires the handling of radioactive material or radiation-producing equipment or which requires access to Radiation Areas, High Radiation Areas, Very High Radiation Areas, Contamination Areas, High Contamination Areas, or Airborne Radioactivity Areas.

radiological (or radiation) work permit (RWP)—Permit that identifies radiological conditions, establishes worker protection and monitoring requirements, and contains specific approvals for radiological work activities. The radiological work permit serves as an administrative process for planning and controlling radiological work and informing the worker of the radiological conditions.

radiological worker—A general employee whose job involves operating radiation-producing devices or working with radioactive materials or who is likely to be routinely occupationally exposed above 0.1 rem (0.001 sievert) per year total effective dose equivalent.

RAM—radioactive material

RCA—Radiological controlled area.

RCT—radiological control technician

real-time air monitoring—Measuring the concentrations or quantities of airborne radioactive materials on a continuous basis.

redundancy—Duplication or repetition of elements in electronic or mechanical equipment to provide alternative functional channels in case of failure. Two systems are not redundant if there is a possible single shared failure point that would defeat the function of both.

reference man *or reference person*—A person with anatomical and physiological characteristics as defined in ICRP 23.

reference reading—A response established for an instrument to a specified radioactive source, either by calculations or by exposing the instrument to the source in a constant and reproducible manner.

removable contamination—Radioactive material that can be removed from surfaces by nondestructive means, such as casual contact, wiping, brushing or washing.

representative sample—A sample that closely approximates both the concentration of activity and the physical and chemical properties of material (e.g., particle size and solubility in the case of air sampling of the aerosol to which workers may be exposed).

reproducibility (precision)—The degree of agreement of repeated measurements of the same property expressed quantitatively as the standard deviation computed from the results of the series of measurements.

residual radioactive material—Any radioactive material that is in or on soil, air, equipment, or structures as a consequence of past operations or activities.

respiratory protective device—An apparatus, such as a respirator, worn by an individual for the purpose of reducing the individual's intake of airborne radioactive materials.

retrospective air sampling—Collecting air samples over a known period of time with the collected sample analysis performed after the sample collection. The air sample is either collected on a filter, in a cartridge, or in a solution (such as a tritium bubbler).

RMA—Radioactive Material Area

routine radiological work—Work that is performed repetitively on a recurring process or operation that incorporates standard radiation protection requirements and practices based on experiences with the existing radiological conditions.

RPD—radiation-producing device

RPO—radiation protection organization

RPP—Radiation Protection Program; also the 10 CFR 835-required document that contains commitments to DOE to implement each requirement of the rule.

RSS—radioactive sealed source

> **Guidance Note**: The following items and equipment, which may be present at LANL, are not considered to be RSSs under the above definition and need not meet the requirements of this LIR:
>
> "Consumer products" that have been approved by the NRC to contain small amounts of RAM for distribution to the public without a license. Examples include tritium "exit" signs; luminous dial wrist watches/compasses; static eliminator brushes; smoke detectors; thoriated optical glass and lenses; gas mantles; welding rods; fluorescent lamp starters; spark gap irradiators; plutonium-powered cardiac pacemakers; certain ceramics/glassware/dental products containing uranium; and ion (electron) generating tubes.
>
> Foils used for neutron activation; activated shielding/equipment/materials not intended to be further manufactured into RSSs; fission chambers; nuclear reactor fuel elements or critical assemblies; RTGs; closed bottles of radioactive solutions in radiochemistry laboratories or isotope (e.g., technetium) generators; uranium and thorium structures used for shielding, ballast, or counterweights; DU used in aircraft ailerons, elevators, landing gear, or rotor blades or DU used to suppress vibration in petroleum exploration equipment; DU instrument check sources typically used by ESH-1 RCTs; military munitions containing RAM, radioactive commodities used in or on military equipment or RAM contained in armor plate; yellow cake (U_3O_8 or UO_4) in closed shipping containers; enriched UF_6 in containers being shipped; sodium iodide detectors seeded with radioactive ^{241}Am; nonfirmly fixed, dry RAM on calibration plates used to calibrate low-level radioactivity counting equipment; RAM-in-process; radioactive x-ray production targets contained within evacuated cavities; and closed canisters of stored SNM.
>
> Based on DOE's definition of an RSS as stated in 10 CFR 835.2, in which nuclear explosive devices are exempt from being designated as RSSs, no radioactive components (for example, pits, war reserve bottles, and neutron generators) of nuclear explosive devices/weapons or nuclear-like devices/weapons shall be controlled as RSSs.

RTG—radioisotope thermoelectric generator; a device containing SNM, the radioactive decay heat from which is used to produce electrical power.

RWP—A radiation work permit, which is a work planning document used to authorize nonroutine, complex, unusual, or abnormally hazardous radiological work not otherwise described, analyzed, and controlled in an approved HCP.

SC—source custodian; a person trained and authorized by operating group management to control and account for the RSSs owned by that group.

SCO—Source Control Office; an office in ESH-12 that is responsible for maintaining the Laboratory's centralized database of all accountable RSSs/GCs containing RAM/machine neutron generators so that the Laboratory can document and demonstrate compliance to federal law (10 CFR 835). **Guidance Note**: The SCO can be contacted at 665-5298 or through the ESH-12 group office (667-5296).

SCRAM button—An electromechanical device, installed in an x-ray or other facility exposure room or enclosure in which workers enter or exit in the course of x-ray/beam operations, that when manually depressed/activated, prevents or interrupts the production of x-rays/the beam from the XGD or other device. **Guidance Note**: SCRAM buttons are wired to the XGD control panel in such a manner that x-ray production cannot be resumed unless the SCRAM button is reset, e.g., depressed SCRAM button manually pulled back out to the "on" position, and x-ray exposure procedures reinitiated at the XGD control panel. Such safety devices permit workers inadvertently caught inside the x-ray exposure room when x-ray operations commence to prevent or interrupt the production of x-rays to permit their own egress from the exposure room to a shielded location. The acronym "SCRAM" historically meant either "safety control rod ax man" or "sudden control rod activation by manual means." Radiation workers have come to know and use this term interchangeably with the term "emergency off switch." The safety function of a SCRAM button is to prevent the XGD from producing x-rays when workers who are inside the room or enclosure have to quickly exit to a safe location outside the room or enclosure. The SCRAM button has basically the opposite safety function to that of an interlock.

sealed radioactive source—A radioactive source manufactured, obtained, or retained for the purpose of utilizing the emitted radiation. The sealed radioactive source consists of a known or estimated quantity of radioactive material contained in a nonradioactive sealed capsule, sealed between layers of nonradioactive material or firmly fixed to a nonradioactive surface by electroplating or other means intended to prevent leakage or escape of the radioactive material. **Guidance Note**: GCs and machine neutron generators containing radioactive material are considered to be RSSs for purposes of accountability and radiological control of the RAM contained in such equipment. Embedded RSSs contained in radiation measuring instruments are also considered to be RSSs for purposes of accountability only. Sealed radioactive sources do not include reactor fuel elements, nuclear explosive devices, or radioisotope thermoelectric generators.

self-contained breathing apparatus (SCBA)—A full-face respirator that supplies air to the wearer from a compressed-air cylinder that is worn on the worker's back.

shield or shielding—Attenuating material used to reduce exposure of personnel to radiation.

shielded intentional XGF installation—An intentional XGF installation that meets the radiation safety requirements specified in ANSI N43.3 (referenced in chapter 18, Part 3). Such installations typically provide a moderate degree of protective shielding to the operator, but the operator typically sustains sufficient annual dose to require individual dosimetry.

smear survey—Quantitative test for detecting the presence of removable contamination. This test is normally performed by wiping a filter paper (or comparable substitute) over 100 cm of the surface and counting the residual activity on the filter with an appropriate laboratory-grade radiation-counting instrument.

SNM—special nuclear material

soil contamination area—An area where the soil is contaminated and is not releasable in accordance with DOE Order 5400.5.

source leak test—A test that determines if a sealed radioactive source is leaking radioactive material.

special protective equipment—Protective clothing items designed or used to provide additional protection against specific hazards expected during the course of work: Saranex 7, ice vest, leather gloves, lead apron, and so forth.

special radiological work—Work that is either first-time, "nonroutine," or complex; and exceeds trigger levels (see Appendix 3B). Special radiological work requires additional planning, review, and determination of radiation protection precautions to be provided for the worker's safety.

step-off pad—An area established at access points to *Radiological Controlled Areas, Radiological Buffer Areas, Contamination Areas, High Contamination Areas, Airborne Radioactivity Areas, or Hot Job Exclusion Areas* used for donning and removing protective clothing. **Guidance Note**: Step-off pads should be large enough to accommodate such activity, may be labeled with protective clothing requirements, and may be layered with adhesive material to help control contamination. Step-off pads should normally be kept free from contamination and verified as such.

stochastic effects—Malignant and hereditary diseases for which the probability of an effect occurring, rather than its severity, is regarded as a function of dose without a threshold for radiation protection purposes.

subcontractor-owned RSS—RSSs owned and possessed under a specific license issued to the subcontractor by either the federal NRC or an NRC Agreement State.

subcontractor-owned XGD—XGDs owned and possessed under an authorization issued to the subcontractor by an NRC Agreement State, such as New Mexico, or by the Office of Radiological Control of a non-Agreement state.

supplemental dosimetry *or secondary dosimetry*—Dosimetry used in addition to primary (whole body) TLDs. Supplemental dosimetry may include extremity dosimetry such as finger rings and electronic dosimetry.

supplied-air suit *or bubble suit*—A suit that covers the entire body and supplies breathing air to the wearer from an independent air supply.

survey—Evaluating the radiological conditions and potential hazards incidental to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation. When appropriate, such an evaluation includes a physical survey of the location of radioactive material and measurements or calculations of levels of radiation, or concentrations or quantities of radioactive material present.

swipe survey—Qualitative test for detecting the presence of removable contamination. This test is normally performed by wiping Masslinn or equivalent over at least 1000 cm of the surface and counting the residual activity on the Masslinn with an appropriate portable radiation survey instrument.

SWP—special work permit

tamper-proof—Containment that prevents unintentional access to access-control system hardware.

temporary shielding—Shielding that is constructed for (1) one run cycle (such as at an accelerator facility), (2) the duration of a single experiment, or (3) a job that lasts less than one year. It is also shielding that is reconfigured to accommodate a new experiment or modify an existing experiment.

thermoluminescent dosimeter (TLD)—Radiation monitoring device used to record the radiological exposure of personnel or areas to certain types of radiation.

transuranic waste—Without regard to source or form, waste that is contaminated with alpha-emitting radionuclides with an atomic number greater than 92 and having half-lives greater than 20 years and concentrations greater than 100 nCi/g at the time of assay.

unaccountable RSS—an RSS whose decayed isotopic activity is less than the corresponding value listed in Appendix 16A of this LIR or whose radioactive half-life is less than 30 days.

unattended intentional XGF installation—An intentional XGD installation that meets the radiation safety requirements specified in ANSI N43.3 (referenced in Chapter 18, Part 3). **Guidance Note**: Such installations are designed for a specific purpose and do not require personnel in attendance.

uncontrolled area—An area to which access is *not* controlled for radiological purposes. The radiological ambient conditions are essentially natural background.

Underground Radioactive Material Area—Underground areas that contain radioactive materials such as pipelines; radioactive cribs; covered ponds; covered ditches; catch tanks; inactive burial grounds; or sites of known, covered, unplanned releases (spills).

Very High Radiation Area—Any area accessible to individuals in which radiation levels could result in an individual receiving an absorbed dose in excess of 500 rads (5 grays) in one hour at 1 meter from a radiation source or from any surface that the radiation penetrates.

visitor—Member of the public requesting access to radiological controlled areas who has not been trained to the level that would permit unescorted access. Visiting scientists and others who visit the Laboratory to perform work are considered general employees.

volume-contaminated material—any item or material that contains radioactivity within it's volume due to either activation (e.g., neutron activation) of the atoms within the item or material or by the incorporation of radioactive material into the volume of the item or material (e.g., mixing of radioactive material into pulverized concrete).

week—A period of seven consecutive days.

work group supervisor—The individual responsible for directing a work group activity (that is, group leader, deputy group leader, team leader, or coworker).

work planner—The individual who coordinates personnel and equipment to get work done.

XCO—XGD/XGF control office; an office in ESH-12 charged with the responsibility of establishing XGD program requirements to (1) provide instrumented XGF radiation safety surveys, (2) perform XGF shielding evaluations, and (3) serve as the central LANL point-of-contact and office of record for the Laboratory-wide management and control of XGDs/XGFs as mandated by DOE.

XGD—X-ray-generating device; a device that produces x-rays. **Guidance Note**: The universe of XGDs can be subdivided into two categories— intentional XGDs and incidental XGDs.

XGF—X-ray-generating facility; the combination of an intentional XGD and its immediate, surrounding, interlocked, shielded enclosure or room. **Guidance Note**: The universe of XGFs can be subdivided into classes based on the dose rate coming through the facility shielding to which XGD operators may be exposed.

XGD/XGF custodian—A person trained and authorized by the operating group leader responsible for the safe use and control of the XGDs/XGFs owned by that group. **Guidance Note**: An XGD/XGF custodian may also be an XGD/XGF operator.

XGD/XGF operator—An individual authorized by the operating group leader and qualified by training and experience to operate specific XGDs/XGFs owned by the group.

year—The period of time beginning on or near January 1 and ending on or near December 31 of that same year used to determine compliance with the provisions of 10 CFR Part 835, November 4, 1998. The starting and ending date of the year may be changed provided that the change is made at the beginning of the year and that no day is omitted or duplicated in consecutive years.